




**Pilot's Operating Handbook  
And FAA Approved  
Airplane Flight Manual**

# SKYHAWK



 Member of GAMA

**Model 172R**  
NAV III Avionics - GFC 700 AFCS  
Serials 17281497 and On

SERIAL NUMBER 17281520  
REGISTRATION NUMBER N62539

*LN-NKF*

This publication includes the material required to be furnished to the pilot by 14 CFR 23.

APPROVED BY FAA APPROVED UNDER 14 CFR PART 21 SUBPART J  
Cessna Aircraft Co.  
Delegation Order Authorization DOW-FS004-02  
*RLS* REGISTRATION AIR

DATE OF APPROVAL 20 December 2007

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WICHITA, KANSAS, USA

ORIGINAL ISSUE - 20 DECEMBER 2007

172RPHBUS-00

U.S.

CESSNA  
MODEL 172R NAV III  
GFC 700 AFCS

SECTION 5  
PERFORMANCE

## PERFORMANCE

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5-1/5-2

## **INTRODUCTION**

Performance data charts on the following pages are presented so that you may know what to expect from the airplane under various conditions and to facilitate the planning of flights in detail with reasonable accuracy. The data in the charts has been computed from actual flight tests with the airplane and engine in good condition and using average piloting techniques.

It should be noted that performance information presented in the range and endurance profile charts allows for 45 minutes reserve fuel at the specified power setting. Fuel flow data for cruise is based on the recommended lean mixture setting at all altitudes. Some indeterminate variables such as mixture leaning technique, fuel metering characteristics, engine and propeller condition, and air turbulence may account for variations of 10% or more in range and endurance. Therefore, it is important to utilize all available information to estimate the fuel required for the particular flight and to flight plan in a conservative manner.

## **USE OF PERFORMANCE CHARTS**

Performance data is presented in tabular or graphical form to illustrate the effect of different variables. Sufficiently detailed information is provided in the tables so that conservative values can be selected and used to determine the particular performance figure with reasonable accuracy.



**SAMPLE PROBLEM** (Continued)

**CRUISE**

The cruising altitude should be selected based on a consideration of trip length, winds aloft and the airplane's performance. A typical cruising altitude and the expected wind enroute have been given for this sample problem. However, the power setting selection for cruise must be determined based on several considerations. These include the cruise performance characteristics presented in Figure 5-8, the range profile chart presented in Figure 5-9, and the endurance profile chart presented in Figure 5-10.

The relationship between power and range is illustrated by the range profile chart. Considerable fuel savings and longer range result when lower power settings are used. For this sample problem, a cruise power of approximately 65% will be used.

The cruise performance chart, Figure 5-8, is entered at 6000 feet pressure altitude and 20°C above standard temperature. These values most nearly correspond to the planned altitude and expected temperature conditions. The engine speed chosen is 2200 RPM, which results in the following:

Power	64%
True airspeed	109 Knots
Cruise fuel flow	7.3 GPH

(Continued Next Page)

**SAMPLE PROBLEM** (Continued)

**FUEL REQUIRED**

The total fuel requirement for the flight may be estimated using the performance information in Figure 5-7 and Figure 5-8. For this sample problem, the time, fuel and distance to climb may be determined from Figure 5-7 for normal climb. The difference between the values shown in the table for 2000 feet and 6000 feet results in the following:

Time:	7 Minutes
Fuel:	1.4 Gallons
Distance:	10 Nautical Miles

These values are for a standard temperature and are sufficiently accurate for most flight planning purposes. However, a further correction for the effect of temperature may be made as noted on the climb chart. The approximate effect of a nonstandard temperature is to increase the time, fuel and distance by 10% for each 10°C above standard temperature, due to the lower rate of climb. In this case, assuming a temperature 16°C above standard the correction would be:

$$\frac{16^{\circ}\text{C}}{10^{\circ}\text{C}} \times 10\% = 16\% \text{ Increase}$$

With this factor included, the fuel estimate would be calculated as follows:

Fuel to climb, standard temperature	1.4 Gallons
Increase due to non-standard temperature (1.4 X 16%)	<u>0.2 Gallons</u>
Corrected fuel to climb	1.6 Gallons

Using a similar procedure for the distance to climb results in 12 nautical miles.

The resultant cruise distance is:

Total distance	360 Nautical Miles
Climb distance	<u>-12 Nautical Miles</u>
Cruise distance	348 Nautical Miles

(Continued Next Page)

**SAMPLE PROBLEM** (Continued)**FUEL REQUIRED** (Continued)

With an expected 10 knot head wind, the ground speed for cruise is predicted to be:

$$\begin{array}{r} 109 \text{ Knots} \\ -10 \text{ Knots} \\ \hline 99 \text{ Knots} \end{array}$$

Therefore, the time required for the cruise portion of the trip is:

$$\frac{348 \text{ Nautical Miles} = 3.5 \text{ Hours}}{99 \text{ Knots}}$$

The fuel required for cruise is:

$$3.5 \text{ hours} \times 7.3 \text{ gallons/hour} = 25.6 \text{ Gallons}$$

A 45-minute reserve requires:

$$\frac{45}{60} \times 7.3 \text{ gallons/hour} = 5.5 \text{ Gallons}$$

The total estimated fuel required is as follows:

Engine start, taxi, and takeoff	1.1 Gallons
Climb	1.6 Gallons
Cruise	25.6 Gallons
Reserve	5.5 Gallons
Total fuel required	<u>33.8 Gallons</u>

Once the flight is underway, ground speed checks will provide a more accurate basis for estimating the time enroute and the corresponding fuel required to complete the trip with ample reserve.

(Continued Next Page)

**SAMPLE PROBLEM** (Continued)**LANDING**

A procedure similar to takeoff should be used for estimating the landing distance at the destination airport. Figure 5-11 presents landing distance information for the short field technique. The distances corresponding to 2000 feet and 30°C are as follows:

Ground roll	625 Feet
Total distance to clear a 50-foot obstacle	1410 Feet

A correction for the effect of wind may be made based on information presented in the note section of the landing chart, using the same procedure as outlined for takeoff.

**DEMONSTRATED OPERATING TEMPERATURE**

Satisfactory engine cooling has been demonstrated for this airplane with an outside air temperature 23°C above standard. This is not to be considered as an operating limitation. Reference should be made to Section 2 for engine operating limitations.

**AIRSPEED CALIBRATION**  
**NORMAL STATIC SOURCE**

CONDITIONS:

Power required for level flight or maximum power descent.

<b>Flaps UP</b>																				
CIAS	50	60	70	80	90	100	110	120	130	140	150	160								
KCAS	56	62	70	79	89	98	107	117	126	135	145	154								
<b>Flaps 10°</b>																				
CIAS	40	50	60	70	80	90	100	110	---	---	---	---								
KCAS	49	55	62	70	79	89	98	108	---	---	---	---								
<b>Flaps FULL</b>																				
CIAS	40	50	60	70	80	85	---	---	---	---	---	---								
KCAS	47	53	61	70	80	84	---	---	---	---	---	---								

Figure 5-1 (Sheet 1 of 2)

**AIRSPEED CALIBRATION**  
**ALTERNATE STATIC SOURCE**

HEATER OFF, VENTS AND WINDOWS CLOSED

<b>FLAPS UP</b>																				
NORMAL KIAS	---	50	60	70	80	90	100	110	120	130	140									
ALTERNATE KIAS	---	51	61	71	82	91	101	111	121	131	141									
<b>FLAPS 10°</b>																				
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---									
ALTERNATE KIAS	40	51	61	71	81	90	99	108	---	---	---									
<b>FLAPS FULL</b>																				
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---									
ALTERNATE KIAS	38	50	60	70	79	81	---	---	---	---	---									

HEATER ON, VENTS OPEN AND WINDOWS CLOSED

<b>FLAPS UP</b>																				
NORMAL KIAS	40	50	60	70	80	90	100	110	120	130	140									
ALTERNATE KIAS	36	48	59	70	80	89	99	108	118	128	139									
<b>FLAPS 10°</b>																				
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---									
ALTERNATE KIAS	38	49	59	69	79	88	97	106	---	---	---									
<b>FLAPS FULL</b>																				
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---									
ALTERNATE KIAS	34	47	57	67	77	81	---	---	---	---	---									

WINDOWS OPEN

<b>FLAPS UP</b>																				
NORMAL KIAS	40	50	60	70	80	90	100	110	120	130	140									
ALTERNATE KIAS	26	43	57	70	82	93	103	113	123	133	143									
<b>FLAPS 10°</b>																				
NORMAL KIAS	40	50	60	70	80	90	100	110	---	---	---									
ALTERNATE KIAS	25	43	57	69	80	91	101	111	---	---	---									
<b>FLAPS FULL</b>																				
NORMAL KIAS	40	50	60	70	80	85	---	---	---	---	---									
ALTERNATE KIAS	25	41	54	67	78	84	---	---	---	---	---									

Figure 5-1 (Sheet 2)

**TEMPERATURE CONVERSION CHART**

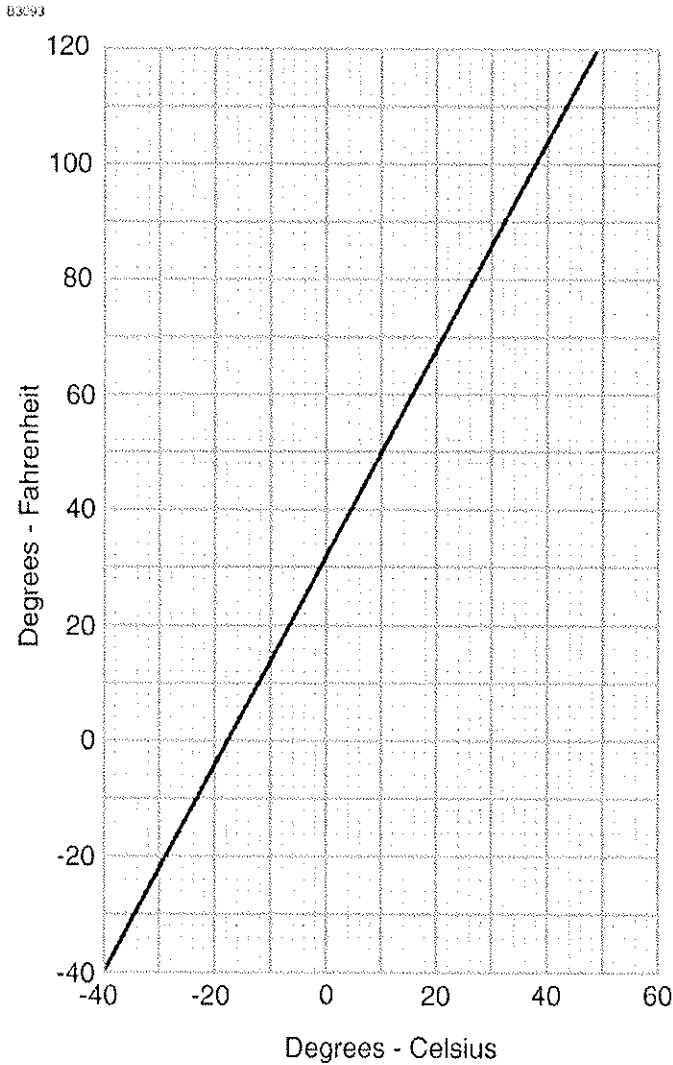


Figure 5-2

**STALL SPEED AT 2450 POUNDS**

CONDITIONS:  
Power IDLE

**MOST REARWARD CENTER OF GRAVITY**

FLAP SETTING	ANGLE OF BANK							
	0°		30°		45°		60°	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	44	51	48	55	53	61	63	73
10°	35	48	38	52	42	58	50	69
FULL	33	47	36	50	40	56	47	66

**MOST FORWARD CENTER OF GRAVITY**

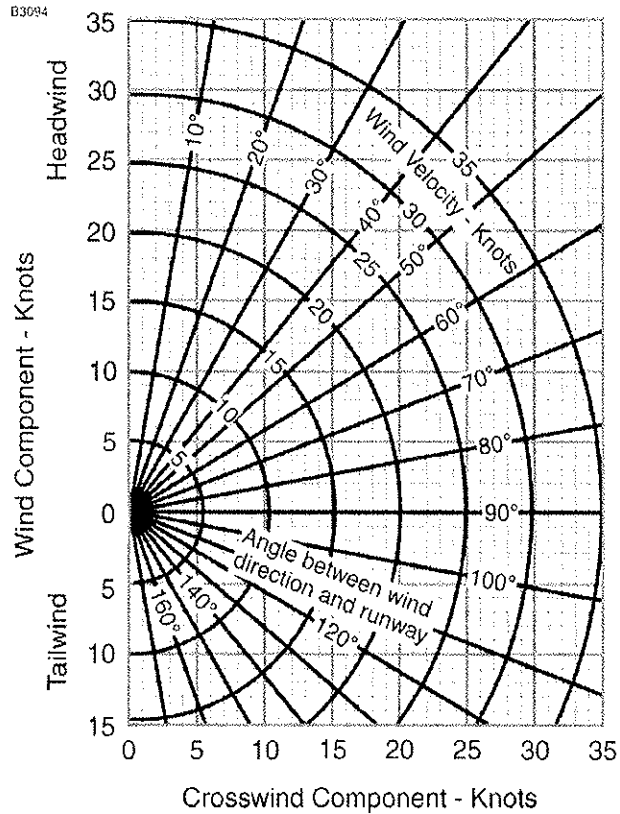
FLAP SETTING	ANGLE OF BANK							
	0°		30°		45°		60°	
	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS	KIAS	KCAS
UP	44	52	48	56	53	62	63	74
10°	37	50	40	53	44	59	53	70
FULL	33	47	36	50	40	56	47	66

**NOTE**

- Altitude loss during a stall recovery may be as much as 230 feet.
- KIAS values are approximate.

Figure 5-3

**CROSSWIND COMPONENT**



**NOTE**

Maximum demonstrated crosswind velocity is 15 knots (not a limitation).

Figure 5-4

**SHORT FIELD TAKEOFF DISTANCE  
AT 2450 POUNDS**

**CONDITIONS:**

Flaps 10°  
Full Throttle prior to brake release.  
Paved, Level, Dry Runway  
Zero Wind

Lift Off: 51 KIAS  
Speed at 50 Feet: 57 KIAS

Pressure Altitude Feet	0°C		10°C		20°C		30°C		40°C	
	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst
Sea Level	845	1510	910	1625	980	1745	1055	1875	1135	2015
1000	925	1660	1000	1790	1075	1925	1160	2070	1245	2220
2000	1015	1830	1095	1970	1185	2125	1275	2290	1365	2455
3000	1115	2020	1205	2185	1305	2360	1400	2540	1505	2730
4000	1230	2245	1330	2430	1435	2630	1545	2830	1655	3045
5000	1355	2500	1470	2715	1585	2945	1705	3175	1830	3430
6000	1500	2805	1625	3060	1750	3315	1880	3590	2020	3895
7000	1660	3170	1795	3470	1935	3770	2085	4105	2240	4485
8000	1840	3620	1995	3975	2150	4345	2315	4775	---	---

**NOTE**

- Short field technique as specified in Section 4.
- Prior to takeoff from fields above 3000 feet pressure altitude, the mixture should be leaned to give maximum RPM in a full throttle, static run-up.
- Decrease distances 10% for each 9 knots head wind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2 knots.
- Where distance value have been deleted, climb performance is minimal.
- For operation on dry grass runway, increase distances by 15% of the "ground roll" figure.

Figure 5-5

**MAXIMUM RATE OF CLIMB  
AT 2450 POUNDS**

CONDITIONS:

Flaps UP  
Full Throttle

Pressure Altitude Feet	Climb Speed - KIAS	Rate of Climb - FPM			
		-20°C	0°C	20°C	40°C
Sea Level	79	830	770	705	640
2000	77	720	655	595	535
4000	76	645	585	525	465
6000	74	530	475	415	360
8000	72	420	365	310	250
10,000	71	310	255	200	145
12,000	69	200	145	---	---

**NOTE**

Mixture leaned above 3000 feet pressure altitude for maximum RPM.

Figure 5-6

**TIME, FUEL AND DISTANCE TO CLIMB  
AT 2450 POUNDS**

CONDITIONS:

Flaps UP  
Full Throttle  
Standard Temperature

Pressure Altitude Feet	Temp °C	Climb Speed KIAS	Rate of Climb FPM	From Sea Level		
				Time Minutes	Fuel Used Gallons	Distance NM
Sea Level	15	79	720	0	0.0	0
1000	13	78	670	1	0.4	2
2000	11	77	625	3	0.7	4
3000	9	76	575	5	1.2	6
4000	7	76	560	6	1.5	8
5000	5	75	515	8	1.8	11
6000	3	74	465	10	2.1	14
7000	1	73	415	13	2.5	17
8000	-1	72	365	15	3.0	21
9000	-3	72	315	18	3.4	25
10,000	-5	71	270	22	4.0	29
11,000	-7	70	220	26	4.6	35
12,000	-9	69	170	31	5.4	43

**NOTE**

- Add 1.1 gallons of fuel for engine start, taxi and takeoff allowance.
- Mixture leaned above 3000 feet pressure altitude for maximum RPM.
- Increase time, fuel and distance by 10% for each 10°C above standard temperature.
- Distances shown are based on zero wind.

Figure 5-7

**CRUISE PERFORMANCE**

CONDITIONS:  
2450 Pounds  
Recommended Lean Mixture

Pressure Altitude Feet	RPM	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
		% MCP KTAS GPH			% MCP KTAS GPH			% MCP KTAS GPH		
		% MCP	KTAS	GPH	% MCP	KTAS	GPH	% MCP	KTAS	GPH
2000	2250	---	---	---	79	115	9.0	74	114	8.5
	2200	79	112	9.1	74	112	8.5	70	111	8.0
	2100	69	107	7.9	65	106	7.5	62	105	7.1
	2000	61	101	7.0	58	99	6.6	55	97	6.4
	1900	54	94	6.2	51	91	5.9	50	89	5.8
4000	2300	---	---	---	79	117	9.1	75	117	8.6
	2250	80	115	9.2	75	114	8.6	70	114	8.1
	2200	75	112	8.6	70	111	8.1	66	110	7.6
	2100	66	106	7.6	62	105	7.1	59	103	6.8
	2000	58	100	6.7	55	98	6.4	53	95	6.2
6000	1900	52	92	6.0	50	90	5.8	49	87	5.6
	2350	---	---	---	80	120	9.2	75	119	8.6
	2300	80	117	9.2	75	117	8.6	71	116	8.1
	2250	76	115	8.7	71	114	8.1	67	113	7.7
	2200	71	112	8.1	67	111	7.7	64	109	7.3
2100	63	105	7.2	60	104	6.9	57	101	6.6	
2000	56	98	6.4	53	96	6.2	52	93	6.0	

**NOTE**

- Maximum cruise power using recommended lean mixture is 80% MCP. Power settings above 80% MCP are listed to aid interpolation. Operations above 80% MCP must use full rich mixture.
- Cruise speeds are shown for an airplane equipped with speed fairings. Without speed fairings, decrease speeds shown by 2 knots.

Figure 5-8 (Sheet 1 of 2)

**CRUISE PERFORMANCE**

CONDITIONS:  
2450 Pounds  
Recommended Lean Mixture

Pressure Altitude Feet	RPM	20°C BELOW STANDARD TEMP			STANDARD TEMPERATURE			20°C ABOVE STANDARD TEMP		
		% MCP KTAS GPH			% MCP KTAS GPH			% MCP KTAS GPH		
		% MCP	KTAS	GPH	% MCP	KTAS	GPH	% MCP	KTAS	GPH
8000	2400	---	---	---	80	122	9.2	76	121	8.7
	2350	81	120	9.3	76	119	8.7	71	118	8.2
	2300	76	117	8.7	71	116	8.2	68	115	7.8
	2200	68	111	7.7	64	110	7.3	61	107	7.0
	2100	60	104	6.9	57	102	6.6	55	99	6.4
	2000	54	96	6.2	52	94	6.0	51	91	5.9
10,000	2350	76	119	8.8	72	118	8.2	68	117	7.8
	2300	72	116	8.3	68	115	7.8	65	113	7.4
	2250	68	113	7.8	65	112	7.4	61	109	7.1
	2200	65	110	7.4	61	108	7.0	59	105	6.7
	2100	58	102	6.6	55	100	6.4	54	97	6.2
	2000	52	94	6.1	51	91	5.9	50	88	5.8
12,000	2350	73	119	8.3	69	117	7.9	65	115	7.5
	2300	69	115	7.9	65	113	7.5	62	111	7.1
	2250	65	112	7.5	62	109	7.1	59	107	6.8
	2200	62	108	7.1	59	105	6.8	57	103	6.6
	2100	56	100	6.4	54	97	6.2	53	94	6.1

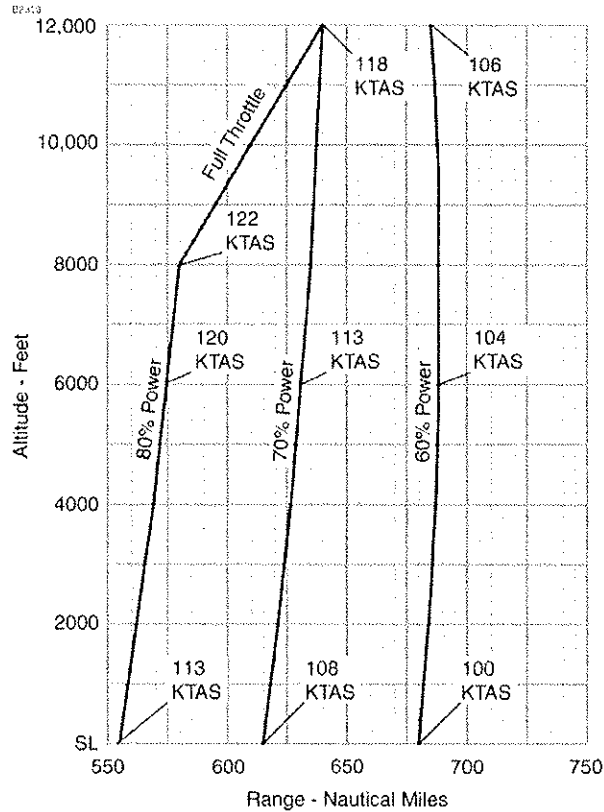
**NOTE**

- Maximum cruise power using recommended lean mixture is 80% MCP. Power settings above 80% MCP are listed to aid interpolation. Operations above 80% MCP must use full rich mixture.
- Cruise speeds are shown for an airplane equipped with speed fairings. Without speed fairings, decrease speeds shown by 2 knots.

Figure 5-8 (Sheet 2)

**RANGE PROFILE**  
45 MINUTES RESERVE  
53 GALLONS USABLE FUEL

CONDITIONS:  
2450 Pounds  
Recommended Lean Mixture for Cruise at all altitudes  
Standard Temperature  
Zero Wind



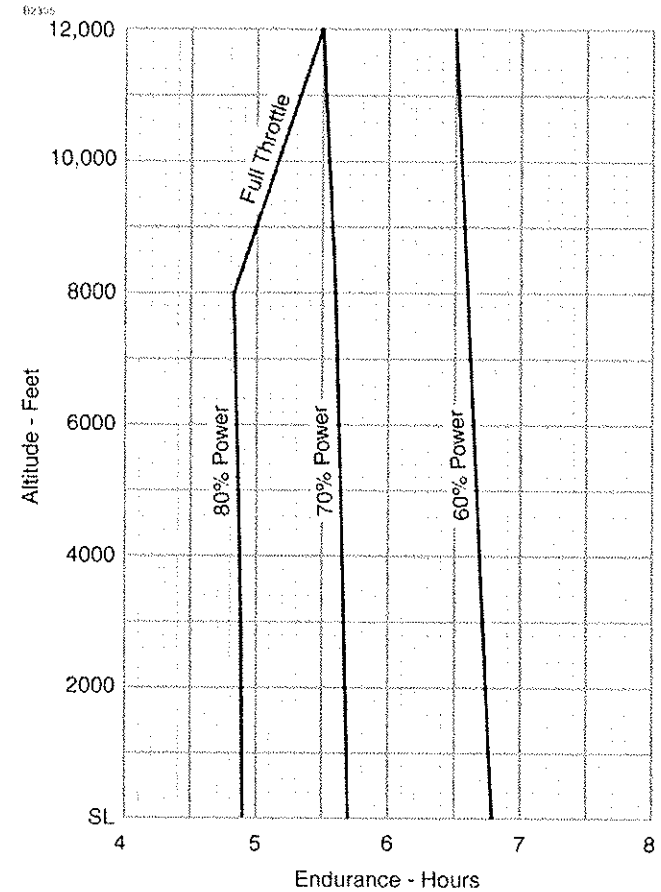
**NOTE**

- This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the distance during a normal climb.
- Cruise speeds are shown for an airplane equipped with speed fairings. Without speed fairings, decrease speeds shown by 2 knots.

Figure 5-9

**ENDURANCE PROFILE**  
45 MINUTES RESERVE  
53 GALLONS USABLE FUEL

CONDITIONS:  
2450 Pounds  
Recommended Lean Mixture for Cruise at all altitudes  
Standard Temperature



**NOTE**

This chart allows for the fuel used for engine start, taxi, takeoff and climb, and the time during a normal climb.

Figure 5-10

**SHORT FIELD LANDING DISTANCE  
AT 2450 POUNDS**

CONDITIONS:

Flaps FULL  
Power IDLE  
Maximum Braking

Zero Wind  
Paved, Level, Dry Runway  
Speed at 50 ft: 62 KIAS

Pressure Altitude Feet	0°C		10°C		20°C		30°C		40°C	
	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst	Gnd Roll Feet	Total Feet To Clear 50 Foot Obst
Sea Level	525	1250	540	1280	560	1310	580	1340	600	1370
1000	545	1280	560	1310	580	1345	600	1375	620	1405
2000	565	1310	585	1345	605	1375	625	1410	645	1440
3000	585	1345	605	1380	625	1415	650	1445	670	1480
4000	605	1380	630	1415	650	1450	670	1485	695	1520
5000	630	1415	650	1455	675	1490	700	1525	720	1560
6000	655	1455	675	1490	700	1530	725	1565	750	1605
7000	680	1495	705	1535	730	1570	755	1610	775	1650
8000	705	1535	730	1575	755	1615	780	1655	810	1695

**NOTE**

- Short field technique as specified in Section 4.
- Decrease distances 10% for each 9 knots head wind. For operation with tail winds up to 10 knots, increase distances by 10% for each 2 knots.
- For operation on dry grass runway, increase distances by 45% of the "ground roll" figure.
- If landing with flaps up, increase the approach speed by 7 KIAS and allow for 35% longer distances.

Figure 5-11